

A HOMOSPOROUS AMERICAN LEPIDOSTROBUS

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Strobili of *Lepidodendron* so perfectly preserved that they can be sectioned and their minutest structures studied are common in European coalfields. Many of these strobili show heterospory, the megasporangia being at the base of the strobilus, the microsporangia above. The extensive literature of the subject is fully cited by SCOTT¹ and SEWARD,² and need not be repeated here. The extensive American coalfields, with but two exceptions, have yielded nothing but casts as yet. Perhaps the reason for this seeming scarcity of petrified material is that it has not been looked for carefully by competent observers.

In 1911 there came to this laboratory from Professor JOHN L. TILTON, of Simpson College, Indianola, Iowa, a well preserved fragment of a strobilus from the coalfields of Warren County, Iowa. This fragment, from above the middle of the strobilus, showed small spores, but of course nothing concerning heterospory could be determined. This specimen, the first American *Lepidostrobus* to be sectioned, was fully described by COULTER and LAND.³ TILTON reexamined very carefully the place where the first fragment was found, and discovered several fragments of cones in a very good state of preservation, and evidently the same species as the first fragment. These he kindly sent to this laboratory. A few fairly well preserved stems of *Lepidodendron* also have been received from the coalfields of western Indiana. No cones were found, but it is evident that these fields will repay intelligent search.

Among the later fragments obtained from TILTON were four pieces which matched perfectly, showing clearly that they were

¹ SCOTT, D. H., *Studies in fossil botany*. London. 1909.

² SEWARD, A. C., *Fossil plants*. Cambridge. 1910.

³ COULTER, J. M., and LAND, W. J. G., *An American Lepidostrobus*. BOT. GAZ. 51:449-453. figs. 23. 1911.

from the same strobilus, the tip being the only part missing. The restored strobilus was 22 cm. long and 5 cm. in diameter at the base. The structures were well preserved, with the exception of the axis, which is replaced by calcite and pyrites. The strobilus is mature; the sporangia have all opened and are empty excepting here and there a few spores. Enough sections were made to show its character, from the base to the broken tip, the general condition of the strobilus being almost exactly identical with that of the fragment described by COULTER and LAND. There is no appreciable difference in size of any of the spores, both those in the basal sporangia and in the sporangia near the apex averaging 27μ in diameter. It seems probable, therefore, that this particular species of *Lepidostrobus* is homosporous, although it is possible that the spores found in the basal sporangia entered through the dehiscence slits. It would seem almost impossible that, in such a well preserved and compact strobilus, all of the megaspores, if there were any, could have escaped. The real solution of the problem lies in the finding of younger strobili which have not yet shed any spores. Negative evidence, however probable, is never conclusive; but the evidence in the present case is so strong that it seems safe to infer that this species of *Lepidostrobus* is homosporous.

The form genus *Lepidostrobus* was originally established to include all of the strobili of *Lepidodendron*. Later it was found that all such strobili could not be included, even in a form genus, so that "true" *Lepidostrobus* is restricted to those strobili of *Lepidodendron* characterized by "the great radial elongation of the sporangium, and its attachment by a long and narrow insertion to the upper surface of the sporophyll-pedicel throughout its length."⁴ The chief interest in connection with these strobili is the question of heterospory. If heterospory has been attained by all these forms, the origin of the homosporous Lycopodiales is left in the region of the unknown. Certain species of *Lepidostrobus* are known to be heterosporous, and all of them are suspected. In one well preserved specimen the microsporangia occur in the upper part of the strobilus and the megasporangia in the lower part, as in certain species of *Selaginella*. The inference has been that

⁴ SCOTT, D. H., Studies in fossil botany. London. 1909.

all the species of *Lepidostrobus* have probably reached the level of *Selaginella* in this feature, or, in other words, that *Selaginella* is the modern representative of this group. In the *Lepidostrobus* form referred to, the microspores are 20μ in diameter, and the megaspores 800μ , so that there is no question as to the great differentiation in size. The discovery of a *Lepidostrobus*, therefore, which is evidently homosporous is worthy of record and consideration. If these old strobili included both homosporous and heterosporous forms, the history of the modern Lycopodiales would become simpler. It would also emphasize the independent origin of heterospory in lines which could by no possibility be related.

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